

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A computer system comprising:
 - a chassis having an air inlet and an air outlet;
 - an air mover disposed within the chassis and associated with either the air inlet or the air outlet and establishing a forced air flow path within the chassis;
 - a first computer module compartment positioned in the chassis and in the forced air flow path so that heat from the first compartment may be transferred to the forced air flow;
 - a first air-to-fluid heat exchanger having at least one internal fluid passage configured to carry a working fluid, and a plurality of heat transfer surfaces therein, and positioned in the chassis between the air inlet and the first compartment in the forced air flow path such that the forced air flows through the heat exchanger and across the heat transfer surfaces and thereby removes a portion of the heat from the air;
 - a second computer module compartment positioned in the chassis and in the forced air flow path;
 - a second air-to-fluid heat exchanger having at least one internal fluid passage configured to carry the working fluid, and a plurality of heat transfer surfaces therein, and positioned in the chassis between the first and second compartments in the forced air flow path such that the forced air flows through the second heat exchanger and across the heat transfer surfaces and thereby removes a portion of the heat from the air;
 - a heat exchanger external to and spaced apart from the chassis and adapted to remove heat from the working fluid; and
 - a controller configured to control the pressure or temperature of the working fluid supplied to the first and second heat exchangers.
2. (Canceled).
3. (Canceled).

4. (Currently amended) The computer system of claim 1 wherein ~~each heat exchanger includes at least one internal fluid passage configured to carry a~~ the working fluid ~~having~~ has a boiling point in the heat exchanger between about 45° F. and about 75° F.

5. (Canceled).

6. (Canceled).

7. (Previously presented) The computer system of claim 1 further comprising:

- a third computer module compartment positioned in the chassis and in the air flow path; and
- a third heat exchanger positioned in the chassis and in the air flow path, wherein the third heat exchanger is positioned at least partially downstream of the second computer module compartment and at least partially upstream of the third computer module compartment.

8. (Previously presented) The computer system of claim 1 wherein the air flow path is substantially vertical.

9. (Previously presented) The computer system of claim 1 wherein the first heat exchanger, the first computer module compartment, the second heat exchanger and the second computer module compartment are arranged vertically one on top of the other in the chassis.

10. (Previously presented) The computer system of claim 9 wherein the first computer module compartment is configured to hold at least a first computer module oriented edgewise with respect to the air flow path.

11. (Previously presented) The computer system of claim 9 wherein the first computer module compartment is configured to hold a plurality of computer modules oriented edgewise with respect to the air flow path.

12. (Previously presented) The computer system of claim 1 wherein the first computer module compartment is configured to hold at least a first computer module oriented edgewise with respect to the air flow path toward a first side of the second heat exchanger, and wherein the second computer module compartment is configured to hold at least a second computer module oriented edgewise with respect to the air flow path from a second side of the second heat exchanger opposite to the first side of the second heat exchanger.

13. (Original) The computer system of claim 1, further comprising:

- a first computer module carried by the first computer module compartment, wherein the first computer module includes at least a first computer processor; and
- a second computer module carried by the second computer module compartment, wherein the second computer module includes at least a second computer processor.

14. (Canceled).

15. (Canceled).

16. (Canceled).

17. (Canceled).

18. (Canceled).

19. (Currently amended) The computer system of claim 4 further comprising:

- a third computer module compartment positioned in the air flow path in the chassis; and
- a third heat exchanger positioned at least partially between the second and third computer module compartments in the air flow path in the chassis, the third heat exchanger including at least one internal fluid passage configured to carry ~~the~~ the working fluid having a boiling point in the second heat exchanger between about 45° F. and about 75° F.

20. (Canceled).

21. (Canceled).

22. (Currently amended) The computer system of ~~claim 3~~ claim 1, wherein the working fluid is carried by the internal fluid ~~passage~~ passages of the first and second heat exchangers, and wherein a first portion of the working fluid is in a liquid state and a second portion of the working fluid is in a gaseous state in the heat exchangers.

23. (Previously presented) The computer system of claim 22, wherein the working fluid is a refrigerant.

24. (Currently amended) The computer system of ~~claim 22~~ claim 23, wherein the working fluid is a refrigerant having a boiling point in the heat exchanger between about 50° F. and about 65° F.

25. (Canceled).

26. (Currently amended) A ~~computer~~ system comprising:

- a chassis;

- an air mover coupled to the chassis to induce a flow of air along a flow path within the chassis;

- a first ~~computer module~~ electronics compartment positioned in the chassis and in the air flow path;

- a first air-to-fluid heat exchanger positioned in the chassis and in the air flow path, wherein the first heat exchanger includes at least one internal fluid passage configured to carry a working fluid that absorbs heat from the air flow path; and

- a heat exchanger positioned external to and spaced apart from the chassis and in fluid communication with the first heat exchanger, wherein the ~~second~~ external heat exchanger is configured to cool the working fluid; and

- a controller operably coupled to the system to control the pressure or temperature of the working fluid supplied to the first heat exchanger.

27. (Currently amended) The ~~computer~~ system of claim 26, further comprising the working fluid, wherein the working fluid has a boiling point in the first heat exchanger between about 45° F. and about 75° F.

28. (Currently amended) The ~~computer~~ system of claim 26, further comprising a plurality of computer modules held in the first ~~computer module~~ electronics compartment.

29. (Currently amended) The ~~computer~~ system of claim 26, further comprising a second ~~computer module~~ electronics compartment positioned in the chassis and in the air flow path, wherein the first heat exchanger is positioned at least partially between the first and second ~~computer module~~ electronics compartments.

30. (Canceled).

31. (Currently amended) The ~~computer~~ system of claim 26, ~~further comprising a~~ wherein the controller ~~operably coupled to the second heat exchanger to maintain~~ maintains the working fluid in phase transition within the first heat exchanger.

32. (Currently amended) The ~~computer~~ system of claim 26 wherein the first ~~computer module~~ electronics compartment is configured to hold a plurality of computer modules oriented edgewise with respect to the air flow path.

33. (Currently amended) The system of claim 26, wherein the chassis has an air inlet and an air outlet; and further comprising:

- a first plurality of computer modules held in the first ~~computer module~~ electronics compartment at least partially in the air flow path;
- a second ~~computer module~~ electronics compartment positioned in the air flow path in the chassis and spaced apart from the first ~~computer module~~ electronics compartment;
- a second plurality of computer modules held in the second ~~computer module~~ electronics compartment at least partially in the air flow path; and
- a second air-to-fluid heat exchanger positioned in the air flow path in the chassis, wherein the second heat exchanger is positioned at least partially downstream of the first ~~computer module~~ electronics compartment and at least partially upstream of the second ~~computer module~~ electronics compartment, and wherein the second heat exchanger includes at least one opening through which the air mover moves air to transfer heat from the air to the fluid.

34. (Currently amended) The ~~computer~~ system of claim 33 wherein the air mover is positioned toward an upper portion of the chassis and configured to draw air upward through the chassis and past the first ~~computer module~~ electronics compartment, the first and second heat exchanger, and the second ~~computer module~~ electronics compartment.

35. (Withdrawn – Currently amended) The ~~computer~~ system of claim 33 wherein the air mover is positioned toward a bottom portion of the chassis and configured to drive air through the chassis and past the first ~~computer module~~ electronics compartment, the heat exchanger, and the second ~~computer module~~ electronics compartment.

36. (Currently amended) The ~~computer~~ system of claim 33 wherein the air mover is carried by the chassis.

37. (Currently amended) The ~~computer~~ system of claim 33 further comprising:

- a third ~~computer module~~ electronics compartment positioned in the air flow path in the chassis and spaced apart from the second ~~computer module~~ electronics compartment;
- a third plurality of computer modules held in the third ~~computer module~~ electronics compartment at least partially in the air flow path; and
- a third heat exchanger positioned in the air flow path in the chassis, wherein the third heat exchanger is positioned at least partially downstream of the second ~~computer module~~ electronics compartment and at least partially upstream of the third ~~computer module~~ electronics compartment, and wherein the third heat exchanger includes at least one opening through which the air mover moves air.

38. (Currently amended) The ~~computer~~ system of claim 33 wherein the air mover, the ~~computer module~~ electronics compartments, and the heat exchangers are arranged vertically with respect to the chassis.

39. (Currently amended) The ~~computer~~ system of claim 33 wherein the first ~~computer module~~ electronics compartment is configured to hold the first plurality of computer modules in edgewise orientation with respect to the air flow path toward a first side of the first heat exchanger, and wherein the second ~~computer module~~ electronics compartment is configured to hold the second plurality of computer modules in an edgewise orientation with respect to the air flow path from a second side of the first heat exchanger opposite to the first side of the first heat exchanger.

40. (Currently amended) The ~~computer~~ system of claim 33 wherein each of the first plurality of computer modules is individually carried by the first ~~computer module~~ electronics compartment, wherein each of the first plurality of computer modules includes at least a first computer processor, wherein each of the second plurality of computer modules is individually carried by the second ~~computer module~~ electronics compartment, and wherein each of the second plurality of computer modules includes at least a second computer processor.

41. (Canceled).

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42. (Currently amended) The ~~computer~~ system of claim 33 wherein the ~~heat exchangers include at least one internal fluid passage configured to carry a working fluid having~~ has a boiling point in the heat ~~exchanger~~ exchangers between about 45° F. and about 75° F.

43. (Currently amended) The ~~computer~~ system of claim 33 wherein each computer module of the first and second pluralities of computer modules includes at least one processor.

44. (Canceled).

45. (Canceled).

46. (Canceled).

47. (Canceled).

48. (Canceled).

49. (Canceled).

50. (Canceled).

51. (Currently amended) A method for dissipating heat generated by a computer module in a chassis, comprising:

- placing an air-to-fluid heat exchanger in the chassis;
- forcing air past a first computer module in the chassis to transfer heat from the computer module to the air;
- moving a first portion of a refrigerant ~~received from a refrigerant source~~ through an internal passage of a first air-to-fluid heat exchanger having a first internal passage;
- transferring heat from at least a portion of the heated air to the first heat exchanger; [[and]]
- boiling at least a portion of the refrigerant in the internal passage;
- after moving the portion of air through the first heat exchanger, moving the portion of air past a second computer module in the chassis to transfer heat from the second computer module to the portion of air;
- moving a second portion of the refrigerant ~~received from the refrigerant source~~ through a second internal passage of a second heat exchanger positioned at least proximate to the second computer module in the chassis; [[and]]
- moving the portion of air through the second heat exchanger to transfer heat from the portion of air to the second heat exchanger and boil at least a portion of the refrigerant in the second internal passage;
- cooling the refrigerant in a heat exchanger that is external to the chassis; and
- controlling the pressure or temperature of the refrigerant supplied to the first and second heat exchangers.

52. (Currently amended) The method of claim 51 wherein the ~~working fluid~~ refrigerant has a boiling point between about 45° F. and about 75° F.

53. (Currently amended) The method of claim 51 wherein the ~~working fluid~~ refrigerant has a boiling point between about 50° F. and about 65° F.

54. (Canceled).

55. (Canceled).

56. (Canceled).

57. (Currently amended) A method for dissipating heat generated in a chassis, comprising:
providing a chassis having an air inlet, an air outlet and at least one heat-generating object therein;
placing an air-to-fluid heat exchanger in the chassis;
moving a working fluid through an internal passage of the heat exchanger;
moving air through the air inlet and through the heat exchanger to transfer heat from the air to the working fluid;
cooling the working fluid in a heat exchanger located outside of and spaced apart from the chassis;
controlling the working fluid to maintain the working fluid at least proximate to the phase transition state while flowing through the internal passage; and
moving at least a portion of the cooled air across the heat generating object to transfer heat to the air.

58. (Previously presented) The method of claim 57 wherein the working fluid has a boiling point between about 45° F. and about 75° F.

59. (Previously presented) The method of claim 57 wherein the working fluid has a boiling point between about 50° F. and about 65° F.

60. (Previously presented) The method of claim 57 wherein the heat-generating object is a first computer module, and wherein the method further comprises, after moving the portion of air across the computer module, moving the portion of air past a second heat exchanger in the chassis to transfer heat from the portion of air.

61. (Original) The method of claim 57 wherein controlling the working fluid to maintain the working fluid at least proximate to the phase transition state includes controlling the pressure of the working fluid.

62. (Canceled).

63. (Canceled).

64. (Canceled).

65. (Canceled).

66. (Canceled).

67. (Canceled).

68. (Canceled).

69. (Canceled).

70. (Canceled).

71. (Canceled).

72. (Currently amended) A method for dissipating heat generated in a chassis, comprising:

providing a first electronics module disposed in the chassis;
locating a first air-to-fluid heat exchanger in the chassis adjacent the first module;
forcing air past the first module in the chassis to transfer heat from the first module to the air;
providing a ~~source of a~~ working fluid;
moving at least a portion of the working fluid through an internal passage of the first air-to-fluid heat exchanger;
transferring heat from at least a portion of the heated air to the working fluid in the first heat exchanger;
boiling at least a portion of the working fluid in the internal passage of the first heat exchanger;
providing a second electronics module disposed in the chassis;
locating a second air-to-fluid heat exchanger in the chassis adjacent the second module;
forcing air past the second module in the chassis to transfer heat from the second module to the air;
moving another portion of the working fluid through an internal passage of the second air-to-fluid heat exchanger;
transferring heat from at least a portion of the heated air to the second heat exchanger;
[[and]]
boiling at least a portion of the working fluid in the internal passage of the second heat exchanger; [[and]]
transferring heat from the working fluid to a ~~third~~ external heat exchanger spaced apart from the chassis; and
controlling the pressure or temperature of the working fluid provided to the first and second heat exchangers.

73. (New) The method of claim 72, wherein controlling the working fluid is selected from the group consisting of: controlling the static pressure of the working fluid; subcooling the working fluid; increasing the heat transfer capacity of the external heat exchanger; and any combination thereof.

74. (New) The computer system of claim 1, wherein a control strategy of the controller is selected from the group consisting of: controlling the static pressure of the working fluid; subcooling the working fluid; increasing the heat transfer capacity of the external heat exchanger; and any combination thereof.

75. (New) The system of claim 26, wherein a control strategy of the controller is selected from the group consisting of: controlling the static pressure of the working fluid; subcooling the working fluid; increasing the heat transfer capacity of the external heat exchanger; and any combination thereof.

76. (New) The method of claim 51, wherein controlling the refrigerant is selected from the group consisting of: controlling the static pressure of the refrigerant; subcooling the refrigerant; increasing the heat transfer capacity of the external heat exchanger; and any combination thereof.

77. (New) The method of claim 57, wherein controlling the working fluid is selected from the group consisting of: controlling the static pressure of the working fluid; subcooling the working fluid; increasing the heat transfer capacity of the external heat exchanger; and any combination thereof.

78. (New) The method of claim 57 wherein controlling the working fluid to maintain the working fluid at least proximate to the phase transition state includes controlling the temperature of the working fluid.

79. (New) A method for cooling an electronic component housed in a cabinet, comprising:
- providing the cabinet with an air inlet and an air outlet;
 - locating an air-to-fluid heat exchanger within the cabinet;
 - providing a heat exchanger external to and spaced from the cabinet;
 - circulating a working fluid through the air-to-fluid heat exchanger and the external heat exchanger;
 - moving air through the air inlet, into the cabinet, across the electronic component and through the air-to-fluid heat exchanger to transfer heat from the electronic component to the working fluid;
 - removing heat from the working fluid in the external heat exchanger; and
 - controlling the pressure or temperature of the working fluid supplied to the air-to-fluid heat exchanger.
80. (New) The method of claim 80, wherein controlling the working fluid does not cause the temperature of the air-to-fluid heat exchanger to drop below the dew point.
81. (New) The method of claim 80, wherein controlling the working fluid does not cause condensation to form on the air-to-fluid heat exchanger or on the electronic component.
82. (New) The method of claim 80, wherein controlling the working fluid includes controlling the static pressure of the working fluid or subcooling the working fluid or increasing the condensing capacity of the external heat exchanger.
83. (New) The method of claim 80, wherein the external heat exchanger is a fluid-to-fluid heat exchanger and the working fluid is cooled with chilled water.
84. (New) The method of claim 80, further comprising a plurality of electronic components and a plurality of air-to-fluid heat exchangers.